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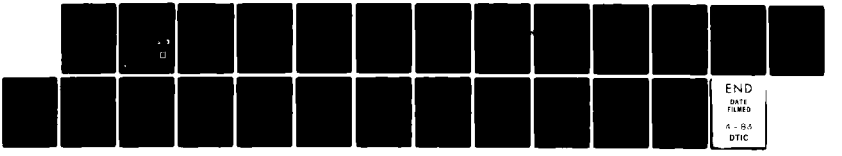

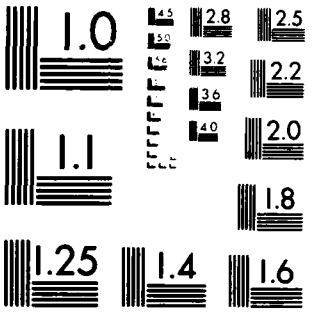

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Technical Report 635

A Compilation Catalog in the Direction of the Galactic Center

L.G. Taff
S.A. Stansfield

18 January 1983

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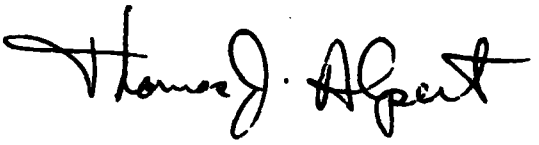
FOR THE COMMANDER



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MASSACHUSETTS INSTITUTE OF TECHNOLOGY
LINCOLN LABORATORY

A COMPILATION CATALOG IN THE DIRECTION OF THE GALACTIC CENTER

L.G. TAFF
S.A. STANSFIELD
Group 94

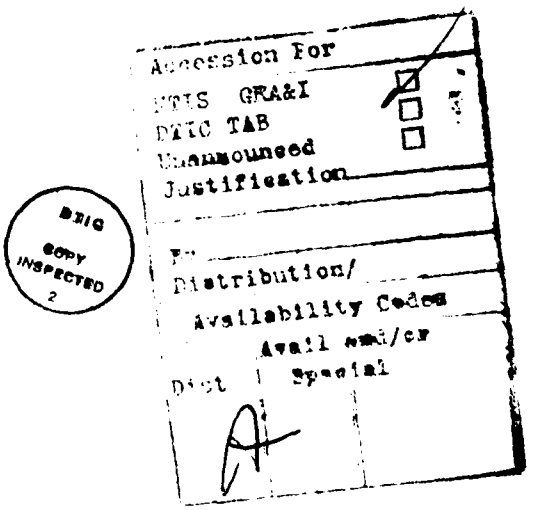
TECHNICAL REPORT 635

18 JANUARY 1983

LEXINGTON MASSACHUSETTS

ABSTRACT

This paper describes the construction of a catalog of positions and proper motions for 130 stars in the direction of the galactic center. All available information for stars within ∿2° of this point has been utilized to produce the best and densest possible reference system. The reference frame of the catalog is that of the Southern Reference Star (SRS) program. The typical star in this catalog has a position and angular velocity based on 16 observations from six source catalogs whose epochs of observation span 77 years. The root mean square positional uncertainty is 0".49 at 1975.0. A total of 13 source catalogs dating back to 1847 have been used. Additional information includes central dates for right ascension and declination, position and proper motion variances, identification numbers, and apparent magnitudes.



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I. INTRODUCTION

Astronomers and astrophysicists who work in wavelength bands outside of the visual region of the electromagnetic spectrum rely on the results of optical astronomers for networks of reference stars from which accurate positions of their sources of radiation may be derived. Frequently the optical counterparts of non-optically detected sources are very faint or lie in the southern half of the celestial sphere. Both of these situations arise in galactic center work. According to Oort (1977) the direction of the galactic center is $\alpha_{GC}=17^h42^m29\overset{s}{.}3$, $\delta_{GC}=-28°59'18"$ (1950.0). Infrared mapping of the galactic center region reveals 10 distinct sources within 10" of (α_{GC}, δ_{GC}) (Becklin and Neugebauer 1975). Radio interferometry of this same area of the sky discloses a large number of thermal sources (Brown, Johnston, and Lo 1981) including the most powerful non-thermal source in the Galaxy (Kellermann et. al. 1977). This source congestion hinders the identification of the infrared sources with the radio ones. This problem is exacerbated by the lack of astrometric work near the galactic center. For reference stars in this direction most workers probably turn to the Smithsonian Astrophysical Observatory Star Catalogue (SAOC; Staff of the SAO 1966). A typical SAOC star in this part of the sky has a position based on two observations (both epoch ~ 1933) and a proper motion based on four observations (the preceeding two observations and two more at epoch ~ 1896). This star's positional uncertainty is 0".97 at 1975.0 and 1".50 at 2000.0. In this paper we do better than the SAOC and at a star density half of its ~ 15 stars per square degree. For the 130 stars in this catalog a typical position and angular velocity depend on 16 observations extending over 77 years. The average positional uncertainty at 1975.0 is 0".49, at 2000.0 it's 0".72. Equally important is the fact that this compilation catalog is on the

reference system of the Southern Reference Star (SRS) program.

The catalog itself is in Table III and is available in punched card form from the authors. The next section discusses the details of its formation. The epoch of orientation and epoch of place for Table III is 1950.0.

II. CATALOG FORMATION

a) Area of the Sky

Catalogs observed at the Cordoba Observatory are important for this work. Cordoba's latitude is -31°25'. Rather than correct for possible zenith discontinuities using a small sample, we chose to stay north of this declination. North of Cordoba's zenith both the Cordoba extension of the AGK1 and the Yale photographic zone catalogs are discontinuous at δ=-27°. Hence we accepted -27° as a northern limit and, since $\delta_{GC} \simeq -29°$, we have used the range $\delta\varepsilon[-27°,-31°]$. Our right ascension limits are $\alpha\varepsilon[17^h33^m30^s, 17^h51^m30^s]$. The area is 15.74 square degrees. A few SRS stars within 0°5 of these boundaries have been included to strengthen the link to the SRS system.

b) Source Catalogs

A total of thirteen catalogs have been used. In addition three catalogs were used to form our local approximation to the SRS system (see below). The source catalogs are

1) Catalogue of 23521 Stars between 13°35' and 45°25' South Declination (WaZ; Eichelberger and Littell 1911)
2) Katalog der Argelander'schen Zoner von 15. bis 31. Grade Sudlicher Declination (AW; Weiss and Argelander 1890)
3) Catalogo de Zonas Estrellas (GA; Gould 1884a, b)
4) Catalogue of 12441 Stars for the Epoch 1880 (Cp 80; Stone 1881)

5) Catalogo General Argentino (Gou; Gould 1886)

6) Catalogo de 15200 Estrellas (Cord B; Perrine 1914)

7) Albany Zone Catalogue of 8276 Stars Between -20° and -41° for the Epoch 1900 (Alb_{00}; Boss 1918)

8) San Luis Catalogue of 15333 Stars for the Epcoh 1910 (SL; Tucker, Roy, and Varnum 1928)

9) Catalogo Astrografico (AC: Perrine 1927a, b, 1928, 1931, 1932, 1933)

10) Catalogo de 6429 Estrellas de Repere (G; Guerin 1934)

11) Cape Photographic Catalogue for 1950.0 (CPC; Jackson and Stoy 1954)

12) Catalogue of the Positions and Proper Motions of 9455 Stars (YT13, II; Schlesinger and Barney 1943)

13) Catalogue of the Positions and Proper Motions of Stars Between Declinations -30° and -35° (YT28; Hoffleit 1967).

In Table I we have listed, for each catalog, the standard deviation of $\Delta\alpha\cos\delta$ and $\Delta\delta$ based on two observations, the mean epoch of the observations for the stars included here, the mean number of observations for the stars included here, the number of stars in the source catalog included here, and the systematic difference between the catalog and our local approximation to the SRS system ($\Delta\alpha\cos\delta$ and $\Delta\delta$ in the sense source catalog - SRS). The standard deviations of the positions are the more conservative of the values found in the individual catalog's introductions and the values summarized by Eichhorn (1974). Star identifications for the oldest catalogs comes from the Geschichte des Fixsternhimmels.

TABLE I

SUMMARY OF SOURCE CATALOGS

Catalog	$\sigma_{\Delta\alpha\cos\delta}$ (2 observations)	$\sigma_{\Delta\delta}$ (2 observations)	Mean Epoch	Average No. Obs.	Number of Stars	Systematic Differences[a] $\Delta\alpha\cos\delta$	Systematic Differences[a] $\Delta\delta$
WaZ	1".5	1".4	1847.1	2.4	92	-0".24	1".33
AW	1.7	1.1	1849.9	1.3	55	-0.16	3.10
GZ	0.73	0.71	1873.6	1.4	99	0.41	1.62
Cp80	0.89	0.58	1878.3	4.3	14	-0.12	0.89
Gou	0.81	0.70	1878.7	3.4	31	1.17	0.34
Cord B	0.54	0.54	1896.3	2.0	130	-0.04	0.14
Alb_{oo}	0.39	0.58	1897.2	2.3	31	0.84	0.15
SL	0.36	0.36	1910.0	5.4	14	-0.03	-0.45
AC	0.56	0.48	1913.6	2.0	130	-0.05	-0.41
G	0.24	0.27	1917.6	2.0	32	-0.30	-0.40
CPC	0.22	0.22	1931.6	2.0	53	-1.19	0.42
YT13,II	0.16	0.16	1933.6	2.0	96	-0.77	0.48
YT28	0.35	0.35	1956.3	2.0	53	0.31	0.65

[a]In the sense source catalog - SRS.

c) Star Selection

Consistent with our small sample and area, and our aim of producing the highest quality compilation catalog possible, we chose for inclusion all SRS stars near (α_{GC}, δ_{GC}) (20 in toto) plus 110 additional stars within the above mentioned right ascension and declination ranges with good observational histories. These can be divided into four groups: (i) in WaZ or AW as well as YT28, $\Delta t \sim$ 108 yrs; (ii) in WaZ or AW and YT13, II, $\Delta t \sim$ 85 yrs; (iii) in one of Gou, GZ, or Cp80 (but not earlier) and YT13, II, $\Delta t \sim$ 57 yrs; or (iv) in Cord B (but not earlier) and YT28, $\Delta t \sim$ 60 yrs. Of the stars we've included 23% are in the first group, 58% are in the second group, and 19% are in the last two groups. Stars in the last group have the fewest observations (9 on the average) but appear in both YT28 and the CPC.

After inspecting the older catalogs it became clear that an individual observation could not confidently carry much weight. Hence no single observation from the oldest five catalogs is included unless there is an observation from one of the other catalogs at a comparable epoch.

d) The SRS System

We have written of "our local approximation to the SRS system" because the formation of the SRS is not yet complete. However, we had available observations from three major sources of the SRS--1) the Perth 70 catalog (Hog et. al. 1976), 2) the Santiago 67 Catalog (Carrasco and Loyola, 1982), and 3) unpublished observations of the U.S. Naval Observatory (Smith 1982). We constructed a weighted mean of these three catalogs for the 20 SRS stars in the vicinity of (α_{GC}, δ_{GC}). See Table II. The departures of

TABLE II

POSITIONS FOR SRS STARS

I.D. Number Cordoba	SRS	Number of Obs.	α[a]	$\sigma_{\alpha\cos\delta}$	Epoch[b] for α	δ[a]	σ_{δ}	Epoch[b] for δ
11129	14284	13	$17^h31^m29^s.046$	0".022	1969.73	-29°13'23".31	0".103	1969.00
11136	14292	11	17 32 01.062	0.060	1969.02	-28 10 17.61	0.042	1967.36
11148	14303	11	17 32 59.918	0.059	1968.53	-30 30 39.30	0.068	1967.37
11193	14352	12	17 37 31.658	0.049	1968.30	-30 25 03.54	0.079	969.40
11195	14355	14	17 37 34.023	0.053	1970.61	-27 52 03.32	0.064	969.34
11197	14356	10	17 37 41.300	0.079	1968.60	-29 34 28.27	0.086	[illegible].18
11210	14369	13	17 38 43.185	0.045	1968.48	-31 19 35.95	0.046	[illegible]7.63
11229	14378	10	17 40 12.700	0.076	1967.94	-27 13 10.96	0.097	1969.31
11251	14398	13	17 41 54.397	0.035	1970.21	-30 09 47.44	0.054	1970.04
11273	14406	14	17 42 49.344	0.038	1969.52	-28 39 33.14	0.058	1969.57
11278	14412	11	17 43 25.618	0.044	1969.24	-29 38 51.55	0.062	1967.36
11291	14424	10	17 44 22.195	0.054	1968.59	-31 10 21.86	0.076	1967.63
11316	14436	11	17 45 41.339	0.033	1969.89	-28 13 50.02	0.064	1968.29
11315	14437	9	17 45 42.429	0.070	1968.89	-30 28 45.39	0.039	1968.39
11364	14466	15	17 48 21.185	0.054	1969.33	-31 24 03.09	0.046	1967.02
11389	14475	13	17 49 15.350	0.061	1969.06	-29 32 32.96	0.087	1968.47
11400	14484	13	17 50 11.786	0.035	1968.42	-28 02 49.69	0.087	1968.74
11425	14504	12	17 52 02.631	0.037	1966.86	-30 35 35.98	0.097	1967.58
11438	14509	12	17 52 24.634	0.024	1969.02	-29 58 12.96	0.064	1967.98
11451	14514	12	17 53 04.666	0.012	1970.11	-31 10 57.32	0.088	1969.65

[a]Epoch of orientation 1950.0

[b]These are epochs of place.

the final SRS system from this one should be at a level well below our average positional uncertainty at 1975.0 (σ=0".49).

e) Systematic Differences

Before computing a position and proper motions for a star all of its positions must be in the same coordinate system. We have insured this by handling general precession on a star by star basis. The precession employed by the catalog's generators from the epoch of place of a star to the catalog's epoch of orientation has been removed. Rigorous general precession was applied to 1950.0 following the procedures summarized in Eichhorn (1974). The computation of the systematic differences between the source catalogs and our local approximation to the SRS system proceeded in a stepwise fashion using the Cordoba B as an intermediary. (The Cordoba B catalog contains all of our stars and its epoch is roughly midway between the extremes of the other source catalogs.) The systematic differences between the individual source catalogs and the SRS are in the rightmost columns of Table I.

f) Data Reduction

Each star's right ascensions and declinations were then separately fit by the method of least squares, with appropriate weights, to the following equations:

$$\alpha(t) = \alpha(0) + \mu_\alpha(0)t$$

$$\delta(t) = \delta(0) + \mu_\delta(0)t$$

From the matrix of the normal equations we calculated the central date, t_c for right ascension and declination and from the inverse of this matrix we found $\sigma_{\alpha\cos\delta}$, etc. in the usual fashion. Note that the covariance of $\alpha(0)$ and $\mu_\alpha(0)$ vanishes at t_c (and similarly for the declination and its associated central date).

III. THE CATALOG

Listed in Table III, for epoch of orientation 1950.0 and epoch of place 1950.0, are α,δ,μ_α, and μ_δ for every star. Also listed are the central dates and the standard deviations of α,δ,μ_α, and μ_δ at the central dates. Estimates for $\sigma_\alpha(t)$ and $\sigma_\delta(t)$ can be computed from

$$\sigma^2_{\alpha,\delta}(t) = \sigma^2_{\alpha,\delta}(t_c) + \sigma^2_{\mu_\alpha,\mu_\delta}(t_c)(t-t_c)^2$$

See also Eichhorn and Googe (1969).

From the data in Table III we have computed the average values of the root mean square positional error at 1950.0, 1975.0, and 2000.0. They are

$$\langle\sigma(1950.0)\rangle = 0\overset{''}{.}28$$

$$\langle\sigma(1975.0)\rangle = 0\overset{''}{.}49$$

$$\langle\sigma(2000.0)\rangle = 0\overset{''}{.}72$$

Finally, Figure 1 is a finding chart of the area. It is based on a blow up of the appropriate SAOC chart.

TABLE III

CATALOG OF POSITIONS AND PROPER MOTIONS

(1) Cordoba ID No.[a]	(2) Mag.[a]	(3) R.A.[b] h m s	(4) μ_α[b] s/cent	(5) σ_α[c] s	(6) σ_{μ_α}[c] s/cent	(7) Central Date	(8) Dec.[b] ° ′ ″	(9) μ_σ[b] ″/cent	(10) σ_δ[c] ″	(11) σ_{μ_δ}[c] ″/cent	(12) Central Date
11129	8.5	17 31 29.041	0.024	0.0036	0.0244	1964.67	-29 15 23.43	0.74	0.064	0.417	1960.28
11146	8.2	17 32 1.077	-0.079	0.0036	0.0250	1963.62	-28 10 17.28	-1.55	0.064	0.325	1959.35
11148	8.4	17 32 59.940	-0.116	0.0036	0.0273	1964.44	-30 30 39.36	0.32	0.065	0.346	1960.88
11157	8.5	17 33 56.579	0.102	0.0110	0.0601	1925.77	-27 4 8.00	0.50	0.141	0.713	1924.54
11158	9.3	17 34 4.992	-0.167	0.0128	0.0767	1932.45	-31 11 24.82	2.21	0.165	0.987	1931.86
11160	9.2	17 34 20.152	-0.188	0.0088	0.0748	1932.96	-30 8 35.66	-3.70	0.115	0.961	1932.67
11161	8.9	17 34 21.552	-0.095	0.0110	0.0649	1926.43	-28 12 58.33	3.57	0.142	0.825	1925.91
11163	8.1	17 34 37.585	-0.049	0.0129	0.0531	1929.05	-30 52 50.01	-1.86	0.168	0.641	1927.66
11164	8.0	17 34 39.096	0.082	0.0084	0.0476	1919.82	-28 24 29.42	1.66	0.112	0.570	1918.22
11165	8.9	17 34 44.076	-0.082	0.0110	0.0659	1926.56	-30 0 57.86	-0.11	0.142	0.837	1926.03
11167	8.5	17 34 48.306	0.049	0.0110	0.0657	1926.54	-28 7 24.34	-0.09	0.142	0.834	1926.02
11168	9.1	17 34 52.858	0.021	0.0110	0.0652	1926.48	-29 4 56.82	2.32	0.142	0.829	1925.95
11170	7.1	17 35 2.078	0.093	0.0094	0.0486	1919.56	-28 1 5.10	0.15	0.124	0.602	1919.00
11174	8.7	17 35 35.287	-0.392	0.0083	0.0446	1927.98	-30 6 12.41	-2.01	0.110	0.583	1928.58
11176	7.5	17 35 51.292	-0.488	0.0094	0.0468	1919.23	-28 23 2.55	-5.88	0.123	0.561	1918.15
11178	8.6	17 36 2.045	0.151	0.0094	0.0584	1923.57	-27 24 52.38	1.96	0.125	0.703	1923.02
11179	8.8	17 36 9.074	0.493	0.0127	0.0663	1931.31	-30 47 32.73	-3.04	0.164	0.844	1930.61
11180	7.5	17 36 9.040	0.011	0.0094	0.0473	1919.27	-29 40 13.99	-3.48	0.123	0.567	1918.22
11182	8.0	17 36 14.773	0.044	0.0099	0.0581	1921.49	-29 55 57.90	0.56	0.126	0.677	1919.11
11185	8.9	17 36 25.922	0.059	0.0128	0.0764	1932.38	-30 51 58.53	-1.02	0.165	0.983	1931.79
11188	9.0	17 36 44.476	-0.040	0.0088	0.0750	1932.96	-30 15 26.58	-0.54	0.115	0.964	1932.66
11189	9.1	17 36 46.828	-0.296	0.0128	0.0764	1932.38	-30 37 5.54	-15.65	0.165	0.983	1931.79

TABLE III. (continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
11190	8.5	17 37 9.006	0.031	0.0083	0.0446	1927.97	-30 11 40.77	-1.50	0.110	0.581	1928.55
11191	7.3	17 37 13.389	0.011	0.0094	0.0488	1919.64	-28 53 50.30	1.22	0.124	0.605	1919.08
11192	9.0	17 37 27.784	0.039	0.0087	0.0589	1931.50	-30 15 25.55	-0.99	0.113	0.756	1931.16
11193	8.7	17 37 31.673	-0.063	0.0036	0.0261	1965.08	-30 25 3.27	-1.50	0.065	0.328	1961.17
11194	9.2	17 37 37.034	-0.157	0.0088	0.0759	1933.00	-30 7 8.05	1.29	0.115	0.976	1932.71
11195	7.8	17 37 39.014	0.055	0.0036	0.0202	1963.32	-27 52 3.09	-0.97	0.062	0.257	1957.27
11196	8.9	17 37 39.866	0.075	0.0110	0.0641	1926.29	-28 0 17.76	2.12	0.142	0.815	1925.77
11197	8.5	17 37 41.283	0.094	0.0035	0.0225	1962.43	-29 34 28.36	0.37	0.062	0.309	1957.94
11198	8.3	17 37 44.280	-0.139	0.0093	0.0541	1922.61	-27 22 13.49	0.26	0.123	0.647	1921.71
11200	9.0	17 37 51.441	0.123	0.0103	0.0524	1922.25	-28 2 51.86	-0.76	0.137	0.674	1922.96
11201	8.8	17 37 59.600	-0.169	0.0105	0.0673	1927.42	-30 46 42.52	-4.88	0.141	0.888	1927.82
11202	9.0	17 37 59.252	0.027	0.0087	0.0545	1931.07	-30 3 10.60	2.08	0.113	0.695	1930.67
11208	8.9	17 38 29.371	0.103	0.0110	0.0652	1926.46	-29 59 19.96	-2.41	0.142	0.829	1925.94
11210	8.8	17 38 43.229	-0.235	0.0036	0.0255	1963.32	-31 19 35.28	-3.78	0.064	0.361	1959.88
11213	8.1	17 38 50.706	0.050	0.0103	0.0539	1925.11	-30 28 7.09	1.26	0.137	0.660	1924.59
11214	8.0	17 39 15.732	0.121	0.0093	0.0546	1922.67	-29 24 55.09	-0.93	0.123	0.653	1921.79
11216	8.7	17 39 25.301	0.025	0.0123	0.0523	1927.74	-30 41 39.03	0.64	0.158	0.632	1926.11
11217	8.4	17 39 29.341	-0.059	0.0095	0.0701	1925.14	-28 17 23.70	0.37	0.127	0.819	1924.71
11222	8.6	17 39 41.090	0.039	0.0094	0.0621	1924.00	-27 49 15.60	11.90	0.126	0.798	1924.01
11224	9.0	17 39 54.885	-0.007	0.0104	0.0597	1923.47	-29 54 44.25	-0.90	0.139	0.847	1925.02
11225	8.8	17 39 57.468	-0.111	0.0103	0.0532	1922.43	-29 54 56.89	0.26	0.137	0.686	1923.17
11228	6.7	17 40 8.727	0.051	0.0094	0.0466	1919.04	-27 51 42.32	0.22	0.123	0.559	1917.99
11229	8.4	17 40 12.714	-0.075	0.0035	0.0186	1961.09	-27 13 10.88	-0.13	0.061	0.265	1956.20
11230	7.8	17 40 17.640	0.047	0.0079	0.0396	1925.20	-30 9 17.15	-0.43	0.103	0.481	1924.43
11239	9.1	17 40 49.689	0.125	0.0103	0.0529	1922.37	-29 29 4.32	-1.85	0.137	0.680	1923.08
11242	8.1	17 41 5.809	0.068	0.0110	0.0598	1925.74	-27 26 11.99	0.64	0.141	0.710	1924.51
11245	9.1	17 41 20.263	0.178	0.0128	0.0750	1932.23	-30 32 57.25	1.98	0.165	0.966	1931.65

TABLE III. (continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
11246	8.5	17 41 27.620	0.094	0.0108	0.0560	1924.57	-28 9 25.89	3.65	0.138	0.662	1923.01
11248	8.4	17 41 37.732	0.010	0.0108	0.0555	1924.45	-27 12 30.78	1.36	0.138	0.658	1922.91
11251	8.8	17 41 54.413	-0.076	0.0034	0.0194	1962.20	-30 9 47.46	0.28	0.059	0.277	1956.94
11252	9.3	17 41 56.877	-0.400	0.0088	0.0767	1933.04	-30 19 37.68	2.76	0.115	0.985	1932.74
11254	8.8	17 41 58.986	-0.066	0.0094	0.0626	1924.08	-27 26 24.37	2.53	0.126	0.804	1924.09
11255	8.8	17 42 1.966	0.045	0.0110	0.0650	1926.43	-28 18 19.92	2.39	0.142	0.827	1925.91
11257	8.5	17 42 4.850	-0.130	0.0095	0.0710	1925.23	-29 49 50.87	-1.42	0.127	0.827	1924.80
11261	8.6	17 42 12.272	-0.098	0.0110	0.0659	1926.56	-28 28 34.59	-3.05	0.142	0.837	1926.03
11262	8.5	17 42 14.243	0.022	0.0112	0.0729	1927.85	-28 1 30.77	2.46	0.144	0.831	1926.61
11263	8.5	17 42 19.621	-0.128	0.0125	0.0602	1929.47	-30 57 43.54	-3.47	0.161	0.776	1928.84
11270	8.1	17 42 27.523	-0.036	0.0093	0.0580	1923.15	-28 23 14.02	-2.70	0.124	0.731	1922.82
11272	8.5	17 42 42.467	0.040	0.0110	0.0599	1925.74	-27 11 50.37	1.75	0.141	0.711	1924.52
11273	8.5	17 42 49.353	-0.046	0.0036	0.0285	1965.42	-28 39 32.90	-1.13	0.064	0.384	1961.75
11276	9.3	17 43 0.789	-0.054	0.0105	0.0682	1927.52	-30 27 9.01	-1.34	0.141	0.900	1927.92
11278	8.0	17 43 25.626	-0.041	0.0036	0.0256	1963.81	-29 58 51.14	0.10	0.064	0.342	1959.80
11279	8.1	17 43 22.955	-0.006	0.0103	0.0524	1922.24	-27 25 12.87	1.30	0.137	0.674	1922.95
11281	8.0	17 43 28.661	-0.003	0.0108	0.0558	1924.57	-29 22 27.96	-0.23	0.138	0.658	1922.99
11283	8.7	17 43 29.655	0.127	0.0109	0.0655	1925.90	-28 10 0.47	1.11	0.140	0.818	1925.07
11284	8.3	17 43 32.902	-0.090	0.0094	0.0646	1924.22	-29 26 8.24	0.71	0.126	0.770	1923.77
11287	9.0	17 43 55.971	0.011	0.0111	0.0730	1927.19	-28 7 54.39	-0.68	0.143	0.936	1926.75
11288	9.3	17 44 0.927	0.103	0.0111	0.0813	1927.81	-28 43 12.26	-0.05	0.143	0.993	1926.98
11289	9.0	17 44 1.957	0.038	0.0111	0.0813	1927.81	-28 41 45.14	2.03	0.143	0.993	1926.98
11290	9.0	17 44 11.933	-0.050	0.0109	0.0655	1925.91	-29 37 17.88	0.58	0.140	0.818	1925.08
11291	8.5	17 44 22.205	-0.047	0.0036	0.0229	1962.88	-31 10 21.76	-0.55	0.063	0.319	1959.01
11292	var.	17 44 24.685	0.049	0.0094	0.0465	1919.05	-27 48 46.73	0.61	0.123	0.558	1918.02
11294	8.7	17 44 30.941	0.262	0.0110	0.0651	1926.50	-28 26 54.64	-4.38	0.141	0.745	1924.90
11295	9.3	17 44 42.297	-0.016	0.0124	0.0553	1928.50	-30 52 52.35	0.76	0.160	0.707	1927.77

TABLE III. (continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
11296	9.1	17 44 41.207	-0.200	0.0111	0.0833	1927.95	-28 23 30.70	-1.05	0.143	1.013	1947.12
11300	8.9	17 44 53.777	0.041	0.0087	0.0546	1931.09	-30 11 49.06	-1.06	0.113	0.696	1930.69
11304	8.7	17 45 1.883	0.018	0.0110	0.0607	1925.89	-28 44 47.72	1.30	0.141	0.719	1924.66
11306	7.9	17 45 13.699	-0.314	0.0087	0.0517	1930.73	-30 17 0.25	-0.78	0.113	0.620	1929.84
11309	8.5	17 45 24.586	0.318	0.0127	0.0668	1931.38	-30 27 36.19	3.80	0.164	0.851	1930.68
11310	9.0	17 45 25.576	-0.025	0.0128	0.0768	1932.43	-30 39 55.29	2.41	0.165	0.989	1931.84
11314	8.7	17 45 32.264	0.042	0.0110	0.0652	1926.45	-28 39 20.80	1.24	0.142	0.828	1925.93
11315	9.0	17 45 42.453	-0.122	0.0036	0.0291	1965.29	-30 28 45.36	-0.04	0.065	0.384	1962.11
11316	8.5	17 45 44.531	0.047	0.0036	0.0219	1963.53	-28 13 50.13	0.67	0.063	0.316	1959.67
11324	6.8	17 46 3.956	0.539	0.0103	0.0425	1919.30	-30 34 55.30	-3.74	0.134	0.518	1918.06
11327	8.7	17 46 11.227	0.026	0.0108	0.0555	1924.45	-27 27 35.70	1.19	0.138	0.657	1922.90
11328	8.1	17 46 14.813	0.174	0.0090	0.0550	1921.58	-29 25 24.30	-1.87	0.123	0.756	1922.87
11329	7.9	17 46 16.999	0.232	0.0110	0.0650	1926.44	-29 17 58.78	0.95	0.142	0.827	1925.92
11331	9.2	17 46 29.107	-0.109	0.0088	0.0763	1933.02	-30 19 5.62	1.22	0.115	0.980	1932.72
11334	8.9	17 46 29.382	-0.244	0.0094	0.0583	1923.59	-27 22 59.37	-2.39	0.125	0.701	1923.03
11336	8.5	17 46 36.090	0.116	0.0114	0.0484	1923.72	-30 32 5.65	1.34	0.154	0.663	1925.53
11343	7.9	17 46 55.183	-0.025	0.0123	0.0521	1927.65	-30 56 46.61	0.20	0.158	0.630	1926.02
11345	9.0	17 46 51.500	0.011	0.0110	0.0650	1926.44	-28 6 56.26	0.21	0.142	0.826	1925.92
11347	9.0	17 47 8.797	0.038	0.0111	0.0716	1927.04	-27 2 59.93	-1.30	0.143	0.918	1926.60
11348	9.2	17 47 13.679	-0.094	0.0088	0.0768	1933.04	-30 11 4.53	0.29	0.115	0.986	1932.75
11350	7.0	17 47 13.359	-0.051	0.0100	0.0516	1921.78	-27 2 50.43	-2.85	0.127	0.611	1919.85
11352	8.1	17 47 29.966	-0.138	0.0094	0.0628	1924.08	-29 15 54.87	-0.68	0.126	0.807	1924.10
11353	8.0	17 47 36.679	0.017	0.0123	0.0519	1927.60	-30 56 30.87	-2.18	0.158	0.626	1925.98
11356	8.0	17 47 51.103	0.072	0.0123	0.0520	1927.62	-30 57 26.69	0.29	0.158	0.629	1926.00
11357	8.5	17 47 53.518	0.033	0.0094	0.0629	1924.09	-28 38 46.20	-5.41	0.126	0.807	1924.11
11360	7.5	17 47 59.421	0.252	0.0090	0.0434	1919.16	-30 42 39.39	-0.28	0.121	0.545	1918.74
11361	8.5	17 47 59.190	-0.411	0.0090	0.0552	1921.56	-27 22 55.57	-9.73	0.123	0.716	1942.40

TABLE III. (continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
11362	8.4	17 48 0.808	0.055	0.0090	0.0543	1921.47	-27 49 0.70	-1.07	0.123	0.746	1922.76
11364	7.7	17 48 21.197	-0.049	0.0036	0.0237	1963.74	-31 24 3.29	1.00	0.065	0.342	1960.67
11365	8.5	17 48 21.025	0.044	0.0079	0.0569	1929.64	-30 16 29.39	1.76	0.105	0.768	1929.87
11368	8.5	17 48 42.656	0.170	0.0103	0.0554	1922.84	-28 56 37.00	2.68	0.138	0.766	1924.25
11369	8.8	17 48 46.370	-0.037	0.0125	0.0601	1929.44	-30 36 2.73	1.06	0.161	0.774	1928.81
11370	9.1	17 48 46.219	0.024	0.0125	0.0600	1929.42	-30 28 58.91	1.17	0.161	0.773	1928.80
11375	9.1	17 48 59.609	0.041	0.0110	0.0659	1926.56	-29 37 14.01	-3.23	0.142	0.837	1926.03
11376	8.2	17 48 59.186	0.015	0.0088	0.0667	1932.54	-30 8 24.37	2.84	0.115	0.847	1932.18
11379	8.4	17 49 0.898	0.122	0.0108	0.0588	1925.03	-28 26 22.55	1.90	0.140	0.733	1924.12
11388	8.0	17 49 15.873	0.177	0.0087	0.0517	1930.73	-30 12 22.98	2.91	0.113	0.620	1929.84
11389	8.5	17 49 15.352	-0.008	0.0036	0.0255	1964.24	-29 52 32.59	-2.02	0.064	0.341	1960.21
11393	8.8	17 49 32.170	0.010	0.0087	0.0517	1930.73	-30 4 49.37	-0.39	0.113	0.620	1929.84
11394	8.6	17 49 27.906	0.127	0.0110	0.0658	1926.48	-27 4 52.71	1.53	0.142	0.774	1925.32
11395	9.1	17 49 35.936	-0.239	0.0128	0.0764	1932.38	-30 34 22.30	-4.31	0.165	0.983	1931.79
11398	9.0	17 50 0.722	-0.043	0.0128	0.0750	1932.23	-30 41 24.01	0.55	0.165	0.966	1931.65
11399	7.7	17 50 0.179	0.065	0.0095	0.0692	1925.08	-27 57 6.96	-0.85	0.127	0.811	1924.63
11400	8.5	17 50 11.774	0.068	0.0036	0.0240	1963.77	-28 2 49.85	0.99	0.063	0.317	1959.57
11403	6.9	17 50 25.945	0.149	0.0094	0.0467	1919.07	-27 16 22.22	2.55	0.123	0.559	1918.00
11404	8.7	17 50 29.906	-0.042	0.0103	0.0528	1922.36	-28 50 43.63	-8.38	0.137	0.679	1923.07
11405	8.7	17 50 31.397	-0.004	0.0110	0.0607	1925.89	-29 0 8.28	4.38	0.141	0.719	1924.66
11409	8.8	17 50 55.290	0.371	0.0125	0.0594	1929.28	-30 51 31.58	0.52	0.161	0.765	1928.65
11411	8.7	17 50 58.117	0.019	0.0125	0.0594	1929.29	-30 51 6.91	0.96	0.161	0.766	1928.66
11413	9.2	17 51 11.248	-0.068	0.0112	0.0634	1928.57	-29 50 35.00	2.88	0.145	1.052	1928.09
11415	8.7	17 51 19.952	0.202	0.0094	0.0619	1923.96	-27 17 6.90	2.43	0.126	0.796	1923.98
11425	8.2	17 52 2.644	-0.064	0.0035	0.0208	1961.17	-30 55 35.96	-0.20	0.063	0.307	1957.58
11438	8.4	17 52 24.659	-0.118	0.0035	0.0225	1962.37	-29 58 12.68	-1.25	0.060	0.300	1957.40
11451	9.0	17 53 4.683	-0.074	0.0037	0.0324	1966.83	-31 10 56.78	-2.78	0.065	0.427	1963.91

Notes to Table III.

a. From the Cordoba B catalogue

b. Epoch of place and orientation 1950.0

c. At epoch of central date.

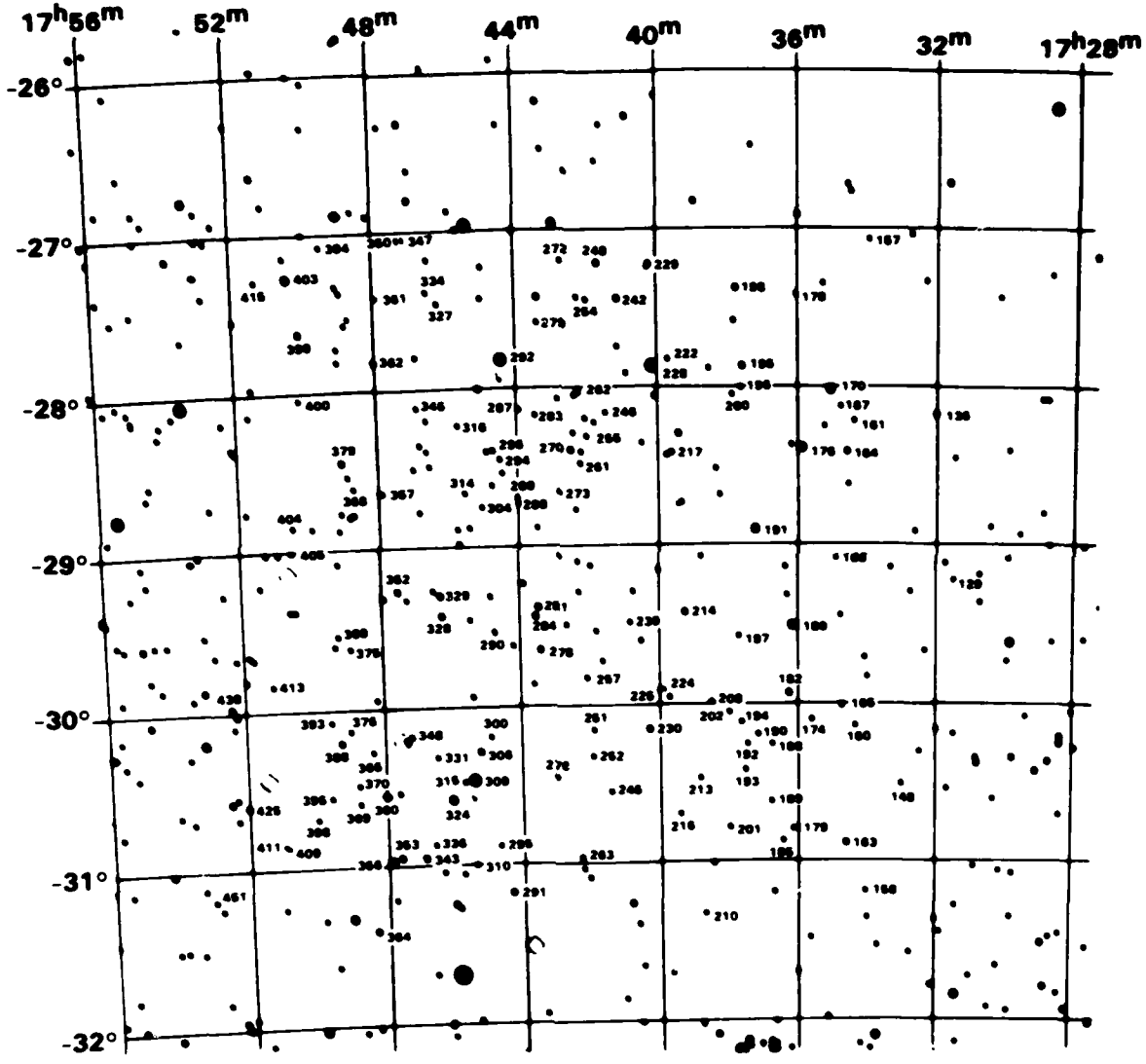

Fig. 1. Finding chart for the direction of the galactic center. Stars are identified by the last three digits of the Cordoba B identification number.

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This paper describes the construction of a catalog of positions and proper motions for 130 stars in the direction of the galactic center. All available information for stars within ~2° of this point has been utilized to produce the best and densest possible reference system. The reference frame of the catalog is that of the Southern Reference Star (SRS) program. The typical star in this catalog has a position and angular velocity based on 16 observations from six source catalogs whose epochs of observation span 77 years. The root mean square positional uncertainty is 0.49 at 1975.0. A total of 13 source catalogs dating back to 1847 have been used. Additional information included central dates for right acension and declination, position and proper motion variances, identification numbers, and apparent magnitudes.

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